UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.:	D/A0047	Total Pages:	
First Named Inventor or Application Identifier			
Christopher R. Dance et al			
Express Mail Label No.:			

APPLICATION ELEMENTS

See MPEP Chapter 600 concerning utility patent application contents.

ADDRESS TO: **Commissioner for Patents**
Box Patent Application
Washington, DC 20231

1. ☒ Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)

2. ☒ Specification (incl. claims) (Total Pages: 11)

3. ☒ Drawing(s) (35 USC 113) (Total Sheets: 5)
☒ Informal ☐ Formal

4. ☐ Oath or Declaration (Total Pages.)
a. ☐ Newly executed (original or copy)
b. ☐ Copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional with Box 17 completed) *[Note Box 5 below]*
☐ i DELETION OF INVENTOR(S)
Signed statement attached deleting Inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).

5. ☐ Incorporation By Reference
(usable if Box 4b is checked)
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)

7. Nucleotide and/or Amino Acid Sequence Submission (If applicable, all necessary)
a. ☐ Computer Readable Copy
b. ☐ Paper Copy (Identical to computer copy)
c ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. ☐ Assignment Papers (cover sheet & document(s))

9. ☐ 37 CFR 3.73(b) Statement ☐ Power of Attorney (when there is an assignee)

10. ☐ English Translation Document (if applicable)

11. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations

12. ☐ Preliminary Amendment

13. ☒ Return Receipt Postcard (MPEP 503) (Should be specifically itemized)

14. ☐ Small Entity Statement(s) ☐ Statement filed in prior application, Status still proper and desired

15. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)

16. ☐ Other

17. ☐ If a **CONTINUING APPLICATION**, *check appropriate box and supply the requisite information:*
☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No. /

18. **CORRESPONDENCE ADDRESS**

☐ *Same as prior application* ☒ *Correspondence address below*

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CITY	Rochester	STATE	NY	ZIP CODE	14644
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(Executed Attachment to Page 1)

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19. ☐ Cancel in this application original claims: of the prior application before calculating the filing fee. (At least one original independent claim is retained for this filing).

20. ☒ The filing fee is calculated below:

CLAIMS AS FILED, LESS ANY CLAIMS CANCELED BY ABOVE-INDICATED AMENDMENT(S)				
(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
TOTAL CLAIMS (37 CFR 1.16(c))	**17** - 20 =	**0**	x $ 18	= **$0.00**
INDEPENDENT CLAIMS (37 CFR 1.16(b))	**3** - 3 =	**0**	x $ 80	= **$0.00**
MULTIPLE DEPENDENT CLAIMS (IF APPLICABLE) (37 CFR 1.16(d))		ANY - - **0**	$ 270	= **$0.00**
			BASIC FEE (37 CFR 1.16(a))	$710.00
			TOTAL =	$ **710.00**

21. ☒ The Commissioner is hereby authorized to charge any filing or prosecution fees which may be required, under 37 CFR 1.16, 1.17, and 1.21 (but not 1.18), or to credit any overpayment, to **Xerox Corporation**, Account No. 24-0025. *An additional copy of this form is enclosed.*

22. ☒ This is an authorization under 37 CFR 1.136(a)(3) to treat any concurrent or future reply, requiring a petition for extension of time, as incorporating a petition for the appropriate extension of time.

23. ☐ Amend the specification by inserting before the first line the sentence:
--This application is a ☐ continuation ☐ continuation-in-part ☐ divisional of Application(s) No(s). , filed .--

24. ☐ A CIP declaration is enclosed.

25. ☐ Power of Attorney

a. ☐ The power of attorney appears in the original papers of the enclosed prior application.
b. ☐ Enclosed is a copy of the declaration and power of attorney from the enclosed prior application.
c. ☐ A new declaration with power of attorney is enclosed.

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26. ☐ The following inventors named in the prior application are deleted per 37 CFR 1.53(b)(1), 1.63(d)(2) and 1.33 (b):

27. ☐ This application is adding one or more inventors under 37 CFR 1.48 to a previously executed application, with an enclosed: peution, fee, newly executed declaration from all inventors, and written consent of the assignee.

28. ☐ This application claims the priority benefit of one or more Provisional Application No(s). and the first sentence of this application has been or will be amended to so indicate.

29. ☐ Priority is claimed from
(reinsert all previous priority claims for the entire chain of any prior applications).

30. ☐ Other paper(s) enclosed:

Respectfully submitted,

Thomas Zell

Thomas Zell
Signature per 37 CFR 1.33 & 34
Date: 11/6/2000
Registration No. 37,481
Telephone No. +33476615112

METHOD AND APPARATUS FOR IMAGE CAPTURE, SELECTION AND COPYING

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method and apparatus for use in digital image capture, and which permits a region of the captured image to be selected and copied, for example to a file, or to a computer's "clipboard", or directly into a computer's application program.

2. Description of Related Art

There are many known apparatus and application programs for capturing a digital image of, for example, a document or photograph or scene. Such apparatus and programs will often have a display facility for displaying the captured image, a selection facility for enabling a region of the image to be controllably selected, and a copy facility for enabling the selected region to be copied to a file, or to a temporary "clipboard", or directly into an application program.

An example of such an application program is CamWorks 4.2 produced by Xerox Corporation. This application provides plural selection tools for enabling a user to specify how the selection of an image region is to be performed, to suit the particular image characteristics. For example, for a picture image, then a suitable selection tool is a rectangular box selection tool, where the user defines a rectangular boundary around the selected region.

The CamWorks 4.2 application also includes plural copying tools for enabling the selected region to be copied to a target location, file or application. Each time that copying is performed, the user has to specify the particular copy tool to be used, for example, "copy as text", "copy as a color image", or "copy as a black and white image". This controls how the image data is processed, and the type of file generated.

Reference is made to the operations manual for CamWorks 4.2, the content of which is incorporated herein by reference, to provide technical information about the operation of the selection and copying tools.

As indicated above, many other forms of image capture apparatus and application programs are known in the art. Reference may be made, for example, to U.S. Patent No. 5,715,501 which relates to a digital copier, and to U.S. Patent No. 5,937,232 which relates to image processing.

SUMMARY OF THE INVENTION

Broadly speaking, one aspect of the present invention is to provide image control modes which control, at least in a default situation, a selection tool for selecting a region of an image, and a copying tool for copying the selected region of the image.

The control mode may be regarded as a global mode for controlling the choice of selection tools automatically. This requires minimal user input, and allows consistent repeated actions.

Preferably, the modes include at least one text mode, and at least one picture mode. Preferably the picture modes include a black-and-white (monochromatic) picture mode, and a color picture mode.

By using modes, the most suitable selection tool and the most suitable copying tool are controlled automatically by the image mode selected by the user. It is therefore no longer necessary for the user to select (or check) the selection tool and the copying tool on each occasion of use. Particularly for repetitive situations, such selecting operations are laborious and time consuming, and can lead to mistakes or inconsistent use.

In a preferred embodiment, the image control mode also controls the display of the image, for example, either as a text image, or as a black-and-white picture image, or as a color picture image.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention are now described by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a schematic block diagram showing the components of an image capture system;

Fig. 2 is a schematic block diagram illustrating the functionality in a first embodiment;

Fig. 3 is a schematic control diagram showing the controls affected by control modes in the first embodiment;

Fig. 4 is a modified schematic illustration of modes in the first embodiment;

Fig. 5 is a schematic illustration of modes in an alternative modified version of the first embodiment;

Fig. 6 is a schematic block diagram illustrating the functionality of a second embodiment of the image capture system; and

Fig. 7 is a schematic control diagram showing the controls affected by control modes in the second embodiment.

DETAILED DESCRIPTION

Referring to Fig. 1, an image capture and processing system 10 comprises an image capture device 12, a data processor 14, a display device 16, a manual input device 18. and a data storage memory 20. The image capture device 12 may be any form of digital camera, or scanner, or copier for generating a digital version of a captured image. The processor 14, display device 16, the input device 18 and the memory 20 are typically components of a computer system executing an image processing application program.

Fig. 2 illustrates the functionality of a first embodiment of the image processing application 22. The application includes an image input section 24, and image processing section 26. The application also includes a section of selection tools 28 for enabling a user to define and select a desired region of a captured image. The selection tools 28 include a rectangular box

selection tool 28a and a word-by-word (or word-to-word) selection tool 28b. The rectangular box tool selection tool 28a operates by enabling the user to define a rectangular boundary around a desired region. The word-by-word (word-to-word) selection tool 28b operates by performing an optical recognition algorithm to identify word patterns and the spaces between words. The user can then select a region on a word-by-word basis. A suitable word-to-word selection tool is described, for example, in commonly owned U.S. Patent Application Serial No. 09/438,891 entitled "Word-to-Word Selection on Images", the content of which is incorporated herein by reference.

The application 22 also includes a section of copy tools 30 for copying a selected region, and outputting copied region to the computer's "clipboard" for temporary storage, or to a file in the memory 20, or directly into another application program running on the computer system. The copy tools include a color picture copy tool 30a, a black-and-white (monochrome) picture image copy tool 30b, and a text image copy tool 30c. Each copy tool generates data representing the image in a respective format, being respectively a black-and-white format, or a color format, or a text format.

In this embodiment, the application also includes control of a display mode 32, including a color display mode 32a, a black-and-white display mode 32b, and a text display mode 32c. The display mode represents the type of display generated on the display device 16. The color display mode 32a is typically a picture mode with a color attribute enabled. The black-and-white display mode 32b is typically a binary picture mode (e.g. black or white with no intermediate gray values). Alternatively, the black-and-white display mode could be monochromatic with a gray scale (i.e. color disabled). The text display mode 32c may be a mode following optical character recognition (OCR) of the input image.

In accordance with the principles of the invention, the application 22 also includes an image mode input 34, which is set by the user to indicate the type of image captured. The image mode may be selected from the following:

(a) color picture mode

(b) black-and-white picture mode

(c) text mode

The image mode 34 is used to control, at least by default, predetermined selections of the display mode 32, the selection tool 28 and the copy tool 30c.

Referring to Fig. 3, when the color mode 34a is selected, this sets the display mode 32 to be the color display 32a, the selection tool 28 to be the rectangular box selection tool 28a, and the copy tool 30 to be the color copy tool 30a.

When the black-and-white mode 34b is selected, this sets the display mode 32 to be the black-and-white display mode 32b, the selection tool 28 to be the rectangular box selection tool 28a, and the copy tool 30 to be the black-and-white copy tool 30b.

When the text mode 34c is selected, this sets the display mode 32 to be the text display mode 32c, the selection tool to be the word-by-word selection tool 28b, and the copy tool 30 to be the text copy tool 30c.

It is possible to provide the user with a manual override facility to modify the default settings to suit a particular situation, but the use of an overall mode control setting simplifies operation of the system. This is especially advantageous for highly repetitive applications, and can provide for more efficient operation and control. The risk of accidental selection mistakes, or ambiguous copy results, can be significantly reduced.

Fig. 4 illustrates a modified embodiment in which the application program provides two display outputs, a first being a real-time live display output 36, and the second being a frozen or "captured" display output 38. In Fig. 4, both of the display outputs 36 and 38 are operable in a color picture mode, a black-and-white picture mode, and a text display mode. The image mode 34 is used to control the display mode for both outputs 36 and 38.

In Fig. 4, a real-time or "live" text display mode is indicated. This may be facilitated if binarisation and OCR can be performed fast enough to appear responsive to changes in the images supplied by the camera. Otherwise, it may be possible to track movements of a document in the camera images

and to change the position of the displayed text (which allows reuse of the previous OCR results).

The display operation illustrated in Fig.4 can ensure that a document image is always displayed in both the live view and the frozen view, in the best mode for the document (as set by the control mode 34 selected by the user).

Fig. 5 illustrates a further modified embodiment in which the application program again provides two display outputs, the first being a live display output 40, and the second being a frozen or captured display output 42. The outputs 40 and 42, are similar to the outputs 36 and 38, respectively, discussed above except that the live output 40 operates only in a fixed, color display mode. This means that the live display output 40 is always a color picture display of the camera image. However, when the user switches to the frozen display output, the frozen image will always be displayed in a best mode for viewing the document (according to the mode control 34 selected by the user). The display operation indicated in Fig. 5 may be suited for applications which do not facilitate real-time OCR for a live text display mode.

Figs. 6 and 7 illustrates the functionality for a second embodiment. The same reference numerals used in Figs. 6 and 7 to denote features equivalent to those described above. The functionality is similar to that of the first embodiment, except that a simplified display 32d is used having only a color picture display mode. Therefore, the output from the display is not controlled by the image mode control 34. However, the mode control 34 still controls which selection tool 28 and which copy tool 30 are used to suit the document, and to simplify operation by the user.

It will be appreciated that the invention, particularly as illustrated by the preferred embodiments, can allow a clear and easy understanding of the user interface for a scanning tool. The displayed image can be well correlated with the information that is copied from the application to the computer's clipboard, or to a file. This can increase the productivity and usefulness of the scanning tool.

It will also be appreciated that the foregoing description is merely illustrative of preferred embodiments of the invention, and that many modifications may be made within the scope and spirit of the invention.

CLAIMS:

1. Apparatus for processing a captured image frame, the apparatus comprising:

   a) a plurality of selection tools for enabling a user to select a region of the image frame, the selection tools including at least one picture region selection tool and at least one text region selection tool;

   b) a plurality of copy tools for copying the selected region of the image frame, the copy tools including at least one picture copy tool and at least one text copy tool; and

   c) a mode control for controlling operation of the apparatus in at least one operating mode, the operating modes including at least one picture mode and at least one text mode;

   wherein the mode control is operative to select which of said selection tools and which of said copy tools are used for processing said image frame in accordance with said mode control.

2. Apparatus according to claim 1, wherein said selection tools include a rectangular box selection tool for a picture image, and a word-by-word selection tool for a text image.

3. Apparatus according to claim 1, wherein said copy tools include a color picture copy tool, and a black-and-white picture copy tool.

4. Apparatus according to claim 1, wherein the control modes include a color picture mode and a black-and-white picture mode.

5. Apparatus according to claim 1, further comprising a display and a display driver for generating a visual image of said frame, wherein the at least one of the display and the display driver is operable in a plurality of display modes, the display modes including at least one text mode and at least one picture mode, wherein the display mode is controlled by said mode control of the apparatus.

6. Apparatus according to claim 5, wherein the display modes include a color picture display mode and a black-and-white picture display mode.

7. Apparatus according to claim 5, wherein the apparatus is operable to generate a live real time image and a frozen image, and said mode control is operable to control the display mode of at least the frozen image.

8. A method of operation of a processor for processing a captured image frame, the processor comprising:

a) a plurality of selection tools for enabling a user to select a region of the image frame, the selection tools including at least one picture region selection tool and at least one text region selection tool;

b) a plurality of copy tools for copying the selected region of the image frame, the copy tools including at least one picture copy tool and at least one text copy tool;

wherein the method comprises automatically selecting which of said selection tools and which of said copy tools are used for processing an image frame based on a mode control, said mode control including at least one picture mode and at least one text mode.

9. A method according to claim 8, wherein the method comprises selecting a said text selection tool and a said text copy tool when said control mode corresponds to a text mode, and selecting a said picture selection tool and a picture copy tool when said control mode corresponds to a picture mode.

10. A method according to claim 8, wherein said selection tools include a rectangular box selection tool for a picture image and a word-by-word selection tool for a text image.

11. A method according to claim 8, wherein said copy tools include a color picture copy tool, and a black-and-white picture copy tool.

12. A method according to claim 8, wherein the control modes include a color picture mode and a black-and-white picture mode.

13. A method according to claim 8, further comprising controlling operation of a display in one of a plurality of display modes, the display modes including at least one text mode and at least one picture mode, wherein the display mode is controlled by said mode control.

14. A method according to claim 13, wherein the display modes include a color picture display mode and a black-and-white picture display mode.

15. In a processor for processing a captured image, the improvement comprising automatic selection of one of a plurality of selection tools, and selection of one of a plurality of copy tools, based on a global mode setting, the global mode setting including at least one text mode and at least one picture mode.

16. The improvement according to claim 15, wherein the global mode settings include a color picture mode and a black-and-white picture mode.

17. The improvement according to claim 15, further comprising automatic selection of a display mode based on said global mode control.

ABSTRACT OF THE DISCLOSURE

An apparatus and method are described for processing a captured (e.g. scanned) image. The apparatus includes a plurality of selection tools for selecting a region of the image to be processed. The selection tools include a word-by-word selection tool for text and a rectangular box selection tool for a picture. The apparatus also includes a plurality of copy tools for copying the selected region. The appropriate selection tool and copy tool are controlled automatically by a global mode control, being one of a text mode, a color picture mode and a black-and-white picture mode. Optionally, the apparatus displays the image in one of a plurality of different display modes, the display mode also being controlled by the global mode control.

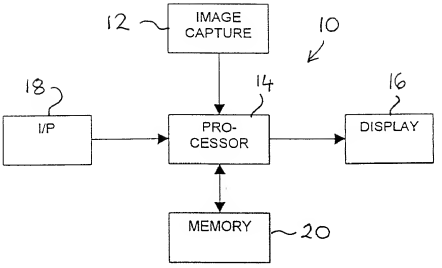
12
IMAGE CAPTURE
10
18
I/P
14
PRO-CESSOR
16
DISPLAY
MEMORY
20

FIG. 1

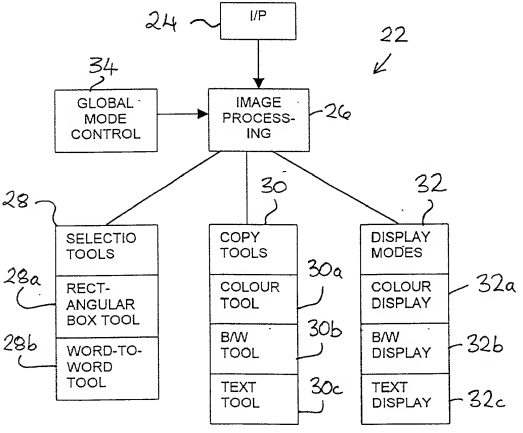
24
I/P
22
34
GLOBAL MODE CONTROL
IMAGE PROCESS-ING
26
28
30
32
SELECTIO TOOLS
RECT-ANGULAR BOX TOOL
WORD-TO-WORD TOOL
28a
28b
COPY TOOLS
COLOUR TOOL
B/W TOOL
TEXT TOOL
30a
30b
30c
DISPLAY MODES
COLOUR DISPLAY
B/W DISPLAY
TEXT DISPLAY
32a
32b
32c

FIG. 2

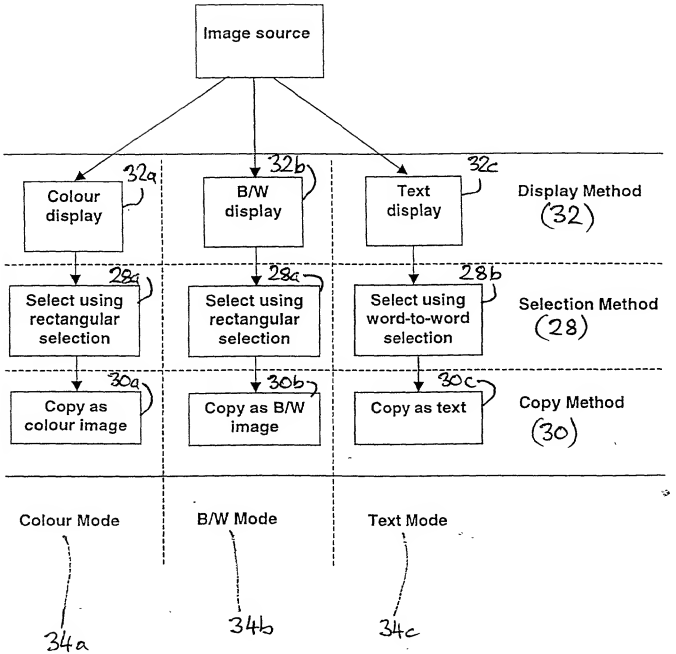
Image source
Colour display
32a
B/W display
32b
Text display
32c
Display Method
(32)
Select using rectangular selection
28a
Select using rectangular selection
28a
Select using word-to-word selection
28b
Selection Method
(28)
Copy as colour image
30a
Copy as B/W image
30b
Copy as text
30c
Copy Method
(30)
Colour Mode
B/W Mode
Text Mode
34a
34b
34c

FIG. 3

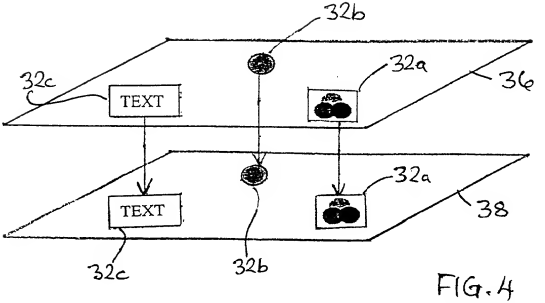
32b
32c
TEXT
32a
36
TEXT
32a
38
32c
32b

FIG. 4

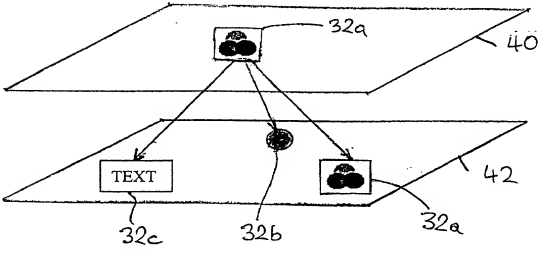
32a
40
TEXT
42
32c
32b
32a

FIG. 5

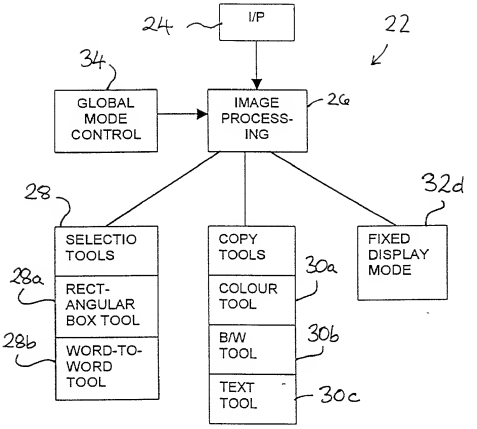
24
I/P
22
34
GLOBAL MODE CONTROL
IMAGE PROCESS-ING
26
28
32d
SELECTIO TOOLS
RECT-ANGULAR BOX TOOL
WORD-TO-WORD TOOL
COPY TOOLS
COLOUR TOOL
B/W TOOL
TEXT TOOL
FIXED DISPLAY MODE
28a
28b
30a
30b
30c

FIG. 6

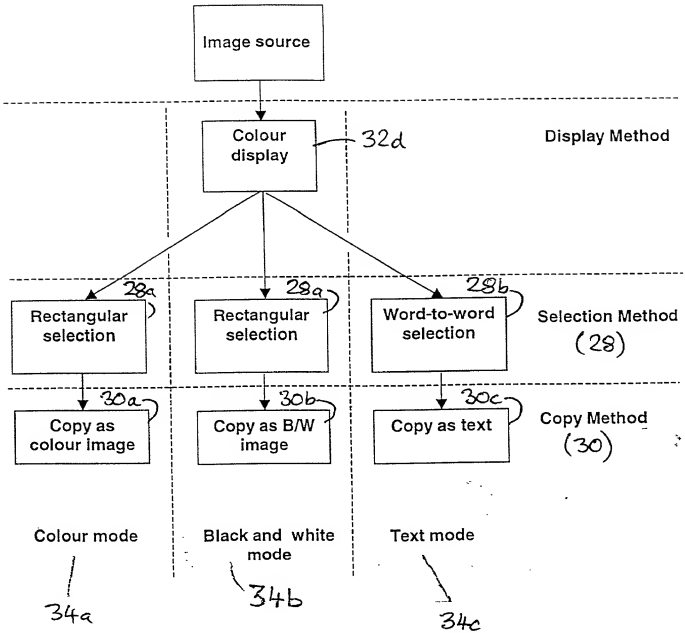
Image source
Colour display
32d
Display Method
28a
Rectangular selection
28a
Rectangular selection
28b
Word-to-word selection
Selection Method
(28)
30a
Copy as colour image
30b
Copy as B/W image
30c
Copy as text
Copy Method
(30)
Colour mode
Black and white mode
Text mode
34a
34b
34c

FIG. 7